

## PANCREATIC FRACTURE: CASE REPORT OF A RARE INJURY

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Blunt injuries of the pancreas are difficult to diagnose and require a high index of suspicion for diagnosis.<sup>1,2</sup> A prolonged interval between injury and diagnosis is a recognized problem. It is important to detect blunt pancreatic injuries early as the mortality can be high (20%).<sup>3</sup> There is also a high incidence of major complications such as pseudocysts, abscesses, haemorrhages or pancreatic fistulae in the survivors.

We highlight the radiological features of a case of pancreatic fracture following blunt abdominal trauma and discuss the problems in diagnosis.

**Keywords:** pancreatic fracture, imaging

### CASE REPORT

A 21 years old male presented with generalized abdominal pain following a motor vehicle accident where his abdomen hit the road divider. Examination showed generalized abdominal guarding and rebound tenderness. He was otherwise well.

Ultrasound examination of the abdomen at presentation showed a moderate amount of free intraperitoneal fluid. No other abnormality was detected. A contrast enhanced CT scan of the abdomen from the diaphragm to the symphysis pubis was then performed in 10 mm slice thickness. This was again reported as unremarkable apart from the free intraperitoneal fluid. The patient was then managed conservatively. On day 2 of admission, his abdomen remained tender but guarding was less. He developed fever and a tinge of jaundice on the third day of admission. There was leucocytosis. Serum amylase was not tested.

As fever persisted on day 4 of admission, a CT scan of the abdomen was repeated. This was

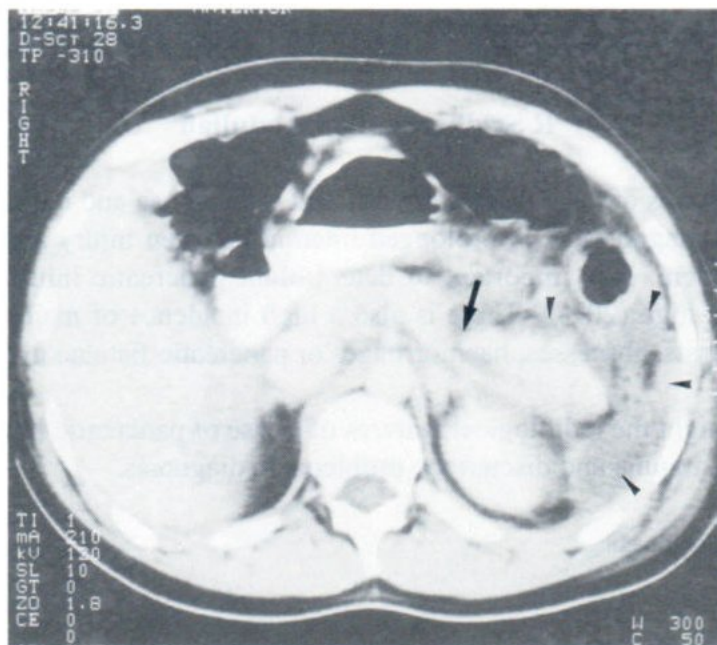
done with intravenous and oral contrast, again in 10-mm slice thickness. A linear hypodense defect was seen at the junction of the body and tail of pancreas (Figure 1). The amount of free intraperitoneal fluid had increased, with fluid now seen in the left anterior pararenal space around the tail of pancreas (displacing the descending colon anteriorly), as well as along the medial aspect of the spleen.

Upon reviewing the first CT scan, the pancreatic fracture was quite obvious even at the first CT scan but was missed due to the subtle changes (Figure 2). In addition there were processes of inflammatory processes seen in the anterior par-renal space. At laparotomy, a complete transection of the pancreas between the body and tail was seen. In addition, there was an inflammatory mass of splenic flexure (of colon), omentum, spleen and distal pancreas with fat saponification. A distal pancreatectomy with splenectomy was performed and omentum patched onto the proximal pancreatic stump.

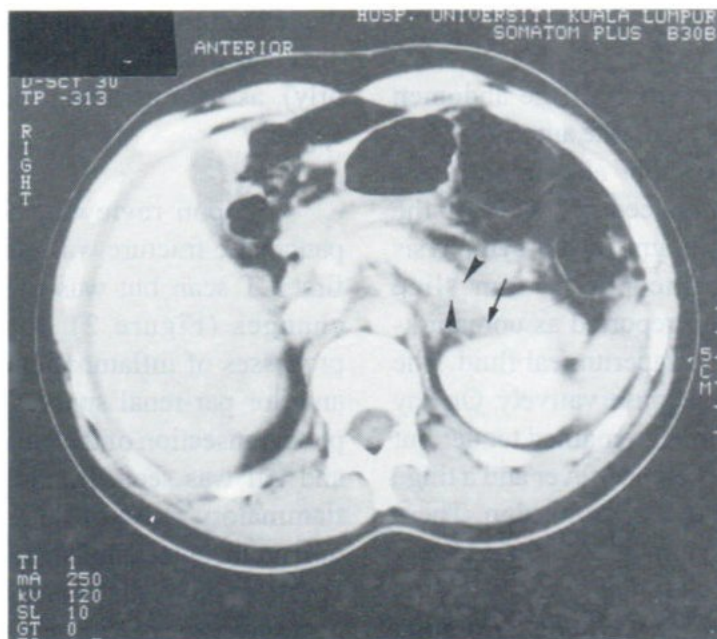
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**Fig. 1.** Linear defect (arrow) at junction of body and tail of pancreas. Note the inflammatory changes (arrow-heads) in the peri-pancreatic as well as the left anterior pararenal space.



**Fig. 2.** CT scan on admission shows the pancreatic fracture (arrowhead) quite clearly. In addition early inflammatory changes (small arrow) already present in the anterior pararenal space

## DISCUSSION

Pancreatic injuries due to blunt trauma are exceedingly uncommon and with an average incidence of one pancreatic injury (contusions, laceration or transection) per 700 blunt abdominal trauma admissions.<sup>2,3</sup> The typical clinical triad for acute pancreatic trauma is upper abdominal pain, leucocytosis and hyperamylasaemia. However, these findings may be partially or completely absent during the first 24 hours after injury.<sup>1</sup> Measurement of serum amylase level is of value in all patients sustaining blunt abdominal trauma.<sup>4</sup> When there is no significant maxillofacial trauma, an elevated serum amylase level reflects pancreatic injury or hollow viscus perforation. In this case, serum amylase was not tested simply because pancreatic injury was not suspected. This in all likelihood contributed to the delay in diagnosis of pancreatic fracture.

An imaging test to accurately diagnose pancreatic injury soon after trauma is important because of the nonspecificity of clinical signs. It is generally accepted that abdominal CT is the imaging modality of choice for diagnosing pancreatic fracture in adults. However, detecting such lesions of the pancreas may be more difficult than detecting nontraumatic pancreatic lesions or traumatic lesions of other abdominal viscera.<sup>3</sup> Pancreatic fracture is seen on abdominal CT as a clear separation, or fracture line across the long axis of the pancreas, most commonly at the neck of pancreas. Even injuries to abdominal organs is seen in up to 90% of patients with traumatic pancreatic fracture, the case presented had no other intra-abdominal injury. Unlike areas of injury to the liver, spleen and kidney, lacerations or fractures of the pancreas may produce little change in density, and such change may not be detected by CT. In addition, there may be minimal separation of the lacerated parenchymal fragments because the pancreas is tightly bound by the retroperitoneal tissues.<sup>4</sup> This is especially true if scans are

obtained within a few hours of trauma when peripancreatic inflammatory changes may be minimal. However secondary signs such as thickening of the left anterior renal fascia (of Gerota), haemorrhage and infiltration of the peripancreatic fat, mesocolon and mesentery should alert the radiologist to the possibility of pancreatic trauma.<sup>3,5</sup>

Streak artifacts can impair visualization of the critical neck-body region that is the most common site of laceration. On occasion, areas of pancreatic injury may be difficult to distinguish from streak or motion artifacts. Gastric decompression, sedation of the patient and the use of very dilute oral Gastrografin have been suggested as means to overcome this problem.<sup>5</sup> However, with the current fast scanners available, motion artifacts are not a major problem.

In this case, although the pancreatic fracture was evident on the initial CT scan, it was missed due to observer error and a low index of suspicion for pancreatic trauma. The second CT scan showed the pancreatic fracture to greater advantage, especially since the peripancreatic inflammatory changes had set in. Other causes cited for a false negative diagnosis of pancreatic fracture include insufficient amount of intravenous contrast injected and haematoma obscuring the fracture.

False positive diagnosis of pancreatic fracture may result from the presence of a vertical low density plane through the neck of pancreas.<sup>3</sup> This finding is thought to be due to the combination of fat around the mesenteric vessels, physiologic thinning of the pancreatic neck and unopacified proximal bowel. Since patients with abdominal trauma frequently have ileus and delayed gastric empty-

ing, orally administered contrast may not reach the small bowel. Thus, the unopacified jejunum may be misinterpreted as enlarged body-tail of pancreas, separated from the head by a "fracture". This problem can be resolved by repeated delayed scans through the area, where a change in contour and opacification of the gut lumen will allow correct diagnosis. In a study by Cook et al,<sup>6</sup> the most common error made in patients with abdominal trauma who underwent CT scanning was a false positive diagnosis of pancreatic injury.

When CT findings are equivocal or when scans are technically inadequate, emergency ERCP may accurately diagnose pancreatic fracture by showing disruption of the pancreatic duct. However this study can only be undertaken in stable patients and requires experienced endoscopists.<sup>2</sup> Magnetic resonance cholangiopancreatography (MRCP) is a relatively new imaging technique for the evaluation of the biliary and pancreatic duct.<sup>7</sup> However, its use in trauma patients will undoubtedly be limited by the need for breath-holding and the inability to adequately monitor such patients while they are in the scanner.

Ultrasonography is very sensitive for the diagnosis of intraperitoneal fluid. However since it cannot reliably identify the pancreas in adults even under elective conditions, it is unlikely that it could demonstrate pancreatic lacerations accurately. This point was demonstrated by the case discussed. A recent study by Harisinghani et al<sup>8</sup> showed that simethicone-coated cellulose given as an oral ultrasound contrast agent enhances ultrasound imaging of the pancreas. The authors however acknowledge that further larger studies are needed to fully evaluate the potential of this oral ultrasound contrast medium.

In conclusion, we highlight the CT appearances of a fracture of the pancreas secondary to blunt abdominal trauma and discussed the problems in diagnosis. A high index of suspicion is required for early diagnosis of such lesions.

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